such as a fuel valve, a blower and a feed water pump as operating state data at specified time intervals. In the case of the halt of the boiler due to a failure, the operation monitoring apparatus is capable of storing operating state data at the time point of the failure occurrence as point-of-failure data and storing operating state data for a specified period of time until the failure occurs.--

Please replace the paragraph beginning on page 3, line 1 with the following rewritten paragraph:

--The present invention has been invented to solve the above addressed problem. In the first aspect of the invention, there is provided a method for monitoring operation of a thermal device, comprising the steps of: storing in sequence detected data on operating states at specified time intervals and detected time thereof as operating state data; storing detected data on operating states when a failure occurs in a thermal device and failure occurrence time as point-of-failure data; storing operating state data for a specified period of time including the failure occurrence time; and outputting stored operating state data and point-of-failure data.--

Please replace the paragraph beginning on page 3, line 13 with the following rewritten paragraph:

--In a second aspect of the invention, there is provided an apparatus for monitoring operating of a thermal device, comprising: detection means for detecting operating states of a thermal device; processing means, storage means; and output means, wherein the processing means stores in sequence detected data and detected time thereof from the detection means in the storage means as operating state data at specified time intervals, stores detected data on operating states when a failure occurs in the thermal device and failure occurrence time in the storage means as point-of-failure data, stores operating state data for a specified period of time including the failure occurrence time in the storage means, and outputs stored data in the storage means to the output means.--

Please replace the paragraph beginning on page 4, line 3 with the following rewritten paragraph:

--In a third aspect of the invention, the apparatus for monitoring operation of the thermal device further comprises a monitoring device for receiving the point-of-failure data and the operating state data of the thermal device.--

Please replace the paragraph beginning on page 4, line 22 with the following rewritten paragraph:

--The embodiments of the present invention will be described hereinafter. Preferred embodiments of the invention are practiced with a thermal device such as a boiler. It will be appreciated that the boiler is structured to detect operating states including a vapor pressure, water level, combustion condition, exhaust gas temperature, and feed water temperature, as well as working stats of control target devices such as a fuel valve, a blower, and a feed water pump, based on which automatic operation control is implemented. Upon determination of a failure from each detected data, the boiler is so structured as to stop after executing specified operation, e.g., fire extinction by closing the fuel valve and post-purge by operation of the blower for a specified period of time.--

Please replace the paragraph beginning on page 5, line 17 with the following rewritten paragraph:

--The processing means performs sampling of detected data on the operating state from the detection means at specified intervals, and stores in sequence the detected data together with detected time thereof in the storage means as operating state data. In the event of a failure in the boiler, the processing means stores detected data at the time of the failure together with the time thereof in the storage means as point-of-failure data and also stores the operating state data for a specified period of time including the failure occurrence time in the storage means.--

Please replace the paragraph beginning on page 6, line 3 with the following rewritten paragraph:

--Upon an abnormal halt of the boiler, the processing means outputs the data stored in the storage processing means, e.g., the operating state data and the point-of-failure data, to the output means such as a display device or a printer. The output means displays or prints each detected data, a type thereof, detected time, and failure occurrence time stored in the operating state data and point-of-failure data, preferably in the form of a graph. Displayed or printed operating state data and point-of-failure data are used to understand the operating states of the boiler at the time of the failure. The operating state data and point-of-failure data include each detected time and failure occurrence time, which allows an operator to understand, with accuracy, a change in the operating states of the boiler with the lapse of the time before and after the failure occurrence, and facilitates identification of the cause of the failure.--

Please replace the paragraph beginning on page 8, line 4 with the following rewritten paragraph:

--In addition, the boiler may be connected to a monitoring device for receiving the point-of-failure data and operating state data. The monitoring side device is connected to the boiler through either wire or wireless communications line. The monitoring device may be installed in the same location or at vicinity of the boiler, or may be installed in a remote location. The monitoring device may also be connected to a plurality of the boilers, for the monitoring the operation states of the boilers and identifying the cause of failures.--

Please replace the paragraph beginning on page 10, line 1 with the following rewritten paragraph:

--The storage means 15 is for storing an operating control procedure and an operating state monitoring control procedure of the boiler 1 as a program. The storage means 15 is structured to store each detected data from the water level detection means 10, the vapor pressure detection means

A9 cancel

11, and the flame detection means 12, as well as the operating state of the fuel valve 4, the blower 6, and feed water pump 7 as data.--

Please replace the paragraph beginning on page 10, line 9 with the following rewritten paragraph:

A10

--The communication device 17 is connected to a monitoring device 20 via a wire or wireless communication line 19. The monitoring device 20 is installed in the location adjacent to the installation site of the boiler 1 like a management station within the same facility as the boiler 1, or a management station distant from the boiler 1. The monitoring device 20, consisting of, for example, a personal computer, is equipped with a display 21 and a printer 22 as output means.--

Please replace the paragraph beginning on page 11, line 8 with the following rewritten paragraph:

A11

--Under the automatic operation of the boiler 1, the processing means 14 then performs sampling of operating state detected data B1, B2, ... at specified time intervals A based on the operation control procedure stored in the storage means 15. The detected data B1, B2, ... is stored in sequence together with detected time C1, C2 ... of the detected data B1, B2, ... in the storage means 15 as operating state data D1, D2, ... (see Fig.2).--

Please replace the paragraph beginning on page 11, line 16 with the following rewritten paragraph:

A12

--The detected data B1, B2, ...consists of: detected data on a water level, vapor pressure, and a combustion state obtained from each detected signal sent from the water level detection means 10, the vapor pressure detection means 11 and the flame detection means 12, and detected data on operating states of the fuel valve 4, the blower 6 and the feed water pump 7. The operating states of the fuel valve 4, the blower 6 and the feed water pump 7 may be detected based on control signals

A12 Cancel

from the processing means 14, or detected from states of power supply to the fuel valve 4, the blower 6 and the feed water pump 7.--

Please replace the paragraph beginning on page 12, line 21 with the following rewritten paragraph:

--In the event of a failure of the boiler 1, the processing means 14 stores detected data on operation states BE and failure occurrence time CE in the storage means 15 as point-of-failure data E. The processing means 14 also stores a specified unit number of the operating state data, e.g., two units of D11 and D22, in the storage means 15 after the occurrence of the failure. As a result, there are stored the point-of-failure data E and the operating state data D3 to D12 for a specified period of time F including the failure occurrence time CE in the storage means 15.--

A13

Please replace the paragraph beginning on page 13, line 7 with the following rewritten paragraph:

--The processing means 14 transmits, via the communication device 17, the operating state data D3 to D12 and the point-of-failure data E to the monitoring device 20. The monitoring device 20 outputs the operating states of the boiler 1 at the time of occurrence of a failure as well as prior and subsequent thereto the display 21 or the printer 22 based on the operating state data D3 to D12 and the point-of-failure data E. The output data is preferably converted to the form visually easy to understand like a graph. Thus, an administrator of the boiler can easily determine the cause of a failure of the boiler 1 from the data indicated on the display 21 or printed by the printer 22.--

A14

Please replace the paragraph beginning on page 13, line 21 with the following rewritten paragraph:

--Out of the operating state data D3 to D12 and the point-of-failure data E transmitted to the monitoring device 20, Fig. 3 describes an example of flame detection data provided by flame

A15

detection means 12 displayed or printed with elapsed time. The flame detection means 12 detects a combustion state as a flame currency value. In Fig. 3 the vertical line represents detected flame currency values while the horizontal line represents time.--

Please replace the paragraph beginning on page 14, line 3 with the following rewritten paragraph:

--As described before, the operating state data D3 to D12 and the point-of-failure data E contain the detection time C3 to C12 and the failure occurrence time CE, respectively. Accordingly, detected data by the flame detection means 12 that is stored in the operation state data D3 to D12 and the point-of-failure data E can be indicated as a change in the flame currency value before and after the occurrence of a failure corresponding to the detected time C3 to C12 and the failure occurrence time CE, as shown with a solid line in Fig. 3. In Fig. 3, the flame currency value is almost constant during the detected time C3 to C8, then gradually decreases from the detected time C8, and equals to "0" at the detected time C11 and thereafter.--

Please replace the paragraph beginning on page 14, line 17 with the following rewritten paragraph:

--If, as with the conventional apparatus, the failure occurrence time is not stored in the point-of-failure data E, it is not determinable at which point of time between the detected time C10 and C11 the failure occurred. Consequently, it is not determinable how the flame currency value changed before and after the failure occurrence time CE, especially between the detected time C10 and C11. In other words, it is impossible to determine if the flame currency value changed as shown with a solid line in Fig. 3, or if the failure occurred immediately after the detected time C10 and become "0" before the detected time C11 as shown with a dashed line in Fig. 3, or if the failure occurred immediately before the detected time C11 and rapidly descended to "0" before the detected time C11

as shown with a dotted line in Fig. 3. On the other hand, in the first embodiment, the operation data D3 to D12 and the point-of-failure data E contain the detected time C3 to C12 and the failure occurrence time CE, respectively, which provides accurate understanding of the change in the flame currency value with elapsed time before and after the failure occurrence time CE as shown with a solid line in Fig. 3.--

Please replace the paragraph beginning on page 18, line 5 with the following rewritten paragraph:

--The boiler installation facility 23 consists of specified number of the boilers 1 (three units in the second embodiment) and the monitoring device 20. The monitoring device 20 in the boiler installation facility 23 monitors and manages the operating state of the boilers 1 in the boiler installation facility 23.--

Please replace the paragraph beginning on page 18, line 11 with the following rewritten paragraph:

--On the other hand, the management facility 24 incorporates a remote monitoring device 25 having the same structure as the monitoring device 20. The remote monitoring device 25 is connected to the monitoring devices 20 via a communication line 19. A public telephone line or a dedicated telephone line may be used as the communication line 19 connecting between the monitoring devices 20 and the remote monitoring device 25.--

Please replace the paragraph beginning on page 18, line 20 with the following rewritten paragraph:

--According to the second embodiment, the monitoring device 20 monitors the operating states of the boilers 1 in the boiler installation facility 23, and transmits the operating state data of the boilers 1 to the remote monitoring device 25 through the communication line 19. Thus, the remote

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monitoring device 25 can monitor the operating states of the boilers 1 in the boiler installation facility 23.--

Please replace the paragraph beginning on page 19, line 3 with the following rewritten paragraph:

--If either of the boilers 1 encounters with a failure and stops, the operating state date D3 to D12 for a specified period of time F including the failure occurrence time of the boiler 1 that encountered with the failure is stored in the storage means 15 of the boiler 1, and also transmitted to the monitoring device 20 in the boiler installation facility 23. The monitoring device 20 then transfers the data to the remote monitoring device 25.--

Q21

Please replace the paragraph beginning on page 19, line 12 with the following rewritten paragraph:

--In the management facility 24, the remote monitoring device 25 outputs the operating states of the boiler 1 that encountered with the failure before and after the failure occurrence time to the display 21 or the printer 22 to identify the cause of the failure. This way of visual identification of the failure allows a repairer to visit the boiler installation facility 23 with carrying appropriate tools for repair. Accordingly, this embodiment saves the repairer trouble of visiting the boiler installation facility 23 twice: one time for identifying the cause of the trouble; and one time for bringing in appropriate tools for repair, or visiting the boiler installation facility 23 with carrying every tool and material necessary for coping with any expected causes of the failure.--

Q22

Please replace the paragraph beginning on page 20, line 3 with the following rewritten paragraph:

--In the second embodiment, the monitoring device 20 is installed in the boiler installation facility 23. However, it will be understood that the boilers 1 may be directly connected to the remote

Q23